We claim:

1. A method of forming a polymer-biomacromolecule conjugate comprising reacting a monomer with chemically active sites on a biomacromolecule, chemically activated sites on the biomacromolecule or sites on the biomacromolecule modified to include polymerization initiation sites.

2. The method of claim 1 wherein the chemically active sites or chemically activated sites on the biomacromolecule comprise natural or non-natural amino acids.

3. The method of claim 2 wherein the biomacromolecule is a protein.

4. The method of claim 3 wherein the activated site is an amino acid modified by an initiator or an initiator is added to the protein to provide an initiator site, or an artificially created initiator amino acid is formed on the protein, or recombinant proteins are generated to include artificial amino acids containing an initiator fragment.

5. The method of claim 1 further including removing the unreacted monomer or non-bonded polymer to obtain a purified biomolecule-polymer conjugate.

6. The method of claim 4 wherein a non-interacting initiator which does not bind to the protein is added and the polymer grown from non-interacting initiator is not covalently bound to the protein.

7. The method of claim 6 further including removing any unreacted monomer or non-bonded polymer to obtain a purified protein-polymer conjugate.

8. A method of forming a protein-polymer conjugate comprising modifying the protein to be reactive with a monomer and reacting the modified protein with said monomer to form the protein-polymer conjugate .

9. A method of forming a protein-polymer conjugate comprising modifying the protein to have functionality suitable for initiation of radical polymerization and reacting the modified protein with monomer.

10. The method of claim 9 wherein the protein is modified to have bromoisobutyrate functionality and the conjugate is formed using atom transfer radical polymerization.

11. The method of claim 9 further including increasing the amount of reactive sites by chemically creating in the protein reactive one or more free thiol sites available for conjugation.

12. The method of claim 11 wherein the protein is reduced with tris-(2-carboxyethyl phosphine hydrochloride to produce additional thiols on the protein for conjugation, modifying the protein by reacting with pyridyl disulfide in the presence of 2-bromobutyrate functionalized resin, capping any unmodified thiols with maleimide to form a macroinitiator and reacting the macroinitiator with a monomer to form the protein-polymer conjugate.

13. The method of claim 9 wherein the monomer and protein are reacted to form a conjugate including poly(N-isopropylacrylamide) or poly(ethylene glycol) methyl ether methacrylate.

14. The method of claim 9 comprising modifying the protein by reacting it with propylmercapto-pyridine 2-bromoisobutyrate and then forming a conjugate by reacting with N-isopropylacrylamide.

15. The method of claim 9 comprising modifying the protein by interacting with a bromoisobutyrate-modified ligand initiator, mixing said protein modified by the bromoisobutyrate-modified ligand initiator with a non-interacting bromoisobutyrate-modified solid phase resin and adding to said mixture a suitable reactive monomer under conditions suitable to initiate polymerization of the protein modified by the bromoisobutyrate-modified ligand initiator with the monomer to form the protein-polymer conjugate.

16. The method of claim 15 wherein the initiator is a bromoisobutyrate-modified biotin initiator.

17. The method of claim 15 wherein the protein is streptavidin.

18. The method of claim15 wherein the monomer is N-isopropylacrylamide.

19. The method of claim 15 wherein the monomer is (ethylene glycol) methylether methacrylate.

20. A protein-polymer conjugate comprising an initiator-modified protein bound to a polymer with the initiator as a link between the protein and the polymer, the protein-polymer conjugate formed by reacting the initiator modified protein with a monomer and polymerizing to form the conjugate.

21. The method of claim 2 wherein the biomacromolecule is an enzyme.

22. The method of claim 21 wherein the enzyme is lysozyme.

23. The method of claim 2 wherein the biomacromolecule is an antibody.